Remarks

Status of the Claims

Claims 1-52 are pending in the application, of which claims 1, 17, 38, and 50 are in independent form. All claims stand rejected. By this paper, claims 1, 10, 17, 21-35, 37-38, 43, and 50 have been amended. Claims 20, 36, and 51-52 have been cancelled as a result of amendments made to other claims. New claims 53-55 have been added. Paragraphs on pages 12 and 14 of the specification have been amended to correct typographical errors.

Reconsideration of all pending claims in view of the amendments and following remarks is respectfully requested.

Claim Objections

Applicant substantially agrees with the changes suggested by the Examiner. However, claim 37 should not read "method" instead of "apparatus" because it depends from claim 10, which is an apparatus claim that is dependent, ultimately, from claim 1. Furthermore, due to the incorporation of claim 36 into claim 1, claim 37 is now believed to have proper antecedent basis.

Claim Rejections

Claims 38-49 were rejected as indefinite under 35 U.S.C. § 112. Applicant has amended claim 38 to eliminate the "may be" language in favor of the language "is capable of conversion," thus curing the alleged defect.

Claims 1-3, 17-19, 38-45 and 50-52 are rejected under 35 U.S.C. § 102(b) as anticipated by Ng et al. ("Ng"). Claims 4-16 and 22-35 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Ng in view of Cookson et al. ("Cookson"). Claims 20, 21, 36, 37 and 46-49 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Ng.

As amended, claim 1 recites an apparatus comprising:

> a decode unit which receives a first encoded interlaced video signal including encoded interframe motion compensation data, and responsively

transmits a decoded interlaced video signal and associated interframe motion compensation data; and

a de-interlace unit which converts said first interlaced video signal to a first progressive video signal by using the interframe motion compensation data to detect an image region moving faster than a threshold rate, and reconstructing said region using only the odd or the even rows of said interlaced signal.

These claimed features solve the problem of banding associated with interlaced-to-progressive conversion without the need for complex extrapolation techniques and/or high-powered microprocessors, and/or expensive high-speed memory systems to store multiple frames to be analyzed.

Ng Does Not Teach or Suggest De-Interlacing by Choosing Only the Odd or Even Rows of an Interlaced Signal In Response To An Image Region Moving Faster Than a Threshold Rate

Ng does not disclose reconstructing an image region using only the odd or the even rows of the interlaced signal upon sensing that the image region is moving faster than a threshold rate.

In rejecting claim 20, which recited "choosing only odd or even rows of video data fields," the Examiner merely stated that "[i]t would have been obvious ... to modify Ng with the known technique of choosing only odd or even rows of video data." The applicant notes, however, that the Examiner did not cite a reference in support of this rejection. To the extent the Examiner is taking Official Notice of using a using a de-interlacing technique of selecting only even or only odd row data of the interlaced data in response to detecting an image region moving faster than a threshold rate, Applicant respectfully traverses that Official Notice and respectfully requests that the Examiner provide a reference in support of the rejection.

A prima facie case of obviousness requires more than a bare allegation without some suggestion by the prior art to make such a modification. The Examiner points to no suggestion for a modification of a Ng de-interlacer that would, in response to "an image region moving faster than a threshold rate[,] . . .reconstruct[] said region using only the odd or the even rows of said interlaced signal." To the

extent the Examiner relies on the inherency of Ng's teaching the limitation at issue to make a 103(a) rejection based on a single reference, the Office Action falls short. "To establish inherency, the extrinsic evidence 'must make clear that the missing descriptive matter is necessarily present in the thing described in the reference, and that it would be so recognized by persons of ordinary skill'." MPEP § 2112. To do so, the Examiner "must provide a basis in fact and/or technical reasoning to reasonably support the determination." *Id.* The Office Action has made no such showing.

Ng discusses blocks of pixels, use of motion vectors, and a controller that sets a spatial flag based on motion information extracted from a compressed signal. See col. 7 and Figure 1, generally. Ng further emphasizes that its temporal deinterlacing is accomplished block-by-block, which occurs after the spatial interpolation process. col 12, lines 33-55. As such, it describes a de-interlacing apparatus that requires at least one additional step not in the claimed invention, i.e. that of further (temporal) deinterlacing after interpolation. Thus, the "de-interlacer" as taught in Ng fails to suggest ignoring half of an interlaced signal region during the reconstruction of a de-interlaced signal where the image region is determined to be moving faster than a threshold rate. Ng is therefore less efficient and does not teach or suggest the claimed apparatus.

Ng further teaches that, depending on whether the spatial flag is set, the data output from the temporal, as opposed to the spatial, de-interlacer will be suppressed. Col. 8, lines 49-65. In such a case, only spatial interpolation is used to fill in the missing parts of the signal. Col. 9, lines 4-13. Claim 1 does not relate to spatial or temporal de-interlacing, but instead distinguishes interlacing specific regions by selecting either the odd or the even rows of the decoded, interlaced signal in that region. Thus, both some of the spatial as well as some of the temporal information will be lost, which is inapposite to Ng, which teaches losing only the temporal information and in no case losing any spatial data.

In sum, the Office Action has failed to prove anticipation and falls short in building a prima facie case of obviousness. Although Ng teaches elimination of computationally expensive motion estimator circuitry, it does not teach or suggest all

ways to accomplish that. Ng, in fact, teaches away from the claimed apparatus by suppressing only temporal data in de-interlacing motion data content as opposed to odd or even rows of an interlaced signal. Therefore, applicant respectfully submits that Ng does not render claim 1, as amended, unpatentable. Claims 2-15 are also patentably distinct by virtue of their dependence from claim 1.

Ng Does Not Teach De-Interlacing by Choosing Only the Odd or Even Rows In Response To an Interlaced Region Having Changed in Position between Successive Video Frames by a at Least a Particular Distance

As amended, claim 17 recites:

> receiving an encoded interlaced video signal including encoded interframe motion compensation data, said first interlaced video signal comprised of data for generating an interlaced video image, and said encoded interframe motion compensation data identifying motion of a region of said interlaced video image;
>
> separating said interframe motion compensation data from said interlaced video signal;
>
> de-interlacing said region of said interlaced video image by selecting only the even or the odd rows of an interlaced video image region in response to said interlaced region having changed in position between successive video frames by at least a particular distance; and
>
> de-interlacing the remaining portions of said interlaced video image using both odd and even rows of said interlaced video signal.

The Examiner rejected claim 17 for similar reasons to that of original claim 1, asserting that "Ng teaches that the motion compensated de-interlacer 16 manipulates the picture data corresponding to the interlace fields from memory according [to] the motion vectors[, which are] used to generate a spatial flag 58, which is then used [to] determine a particular conversion mode with respect to each block of data."

However, Ng does not disclose or suggest "selecting *only the even or the odd rows* of an interlaced video image region *in response* to said interlaced region having changed in position between successive video frames by at least a particular distance."

For at least the reason that Ng does not teach or suggest the selection of only the even or the odd rows of an interlaced video image when Ng's spatial flag is set, as discussed above, claim 17 is patentably distinct. Applicant further relies on the nonobviousness arguments as made in connection with claim 1, above, and submits that claim 17 is also patentably distinct from Ng. Claims 18-19, 21-35, and 37 are likewise patentably distinct from Ng by virtue of their dependence on claim 17.

Ng Does Not Teach or Suggest Interpolation Between the Selected Even or Odd Rows to Fill Missing Rows

With regard to claim 21, the Examiner noted that "various interpolating schemes" were well known in the art, and rejected claim 21 without citation of a reference. Applicant respectfully traverses this rejection. As amended, 21 recites "interpolating between said selected even and odd interlaced rows, to fill, respectively, the missing odd or even interlaced rows." The amended portion is for clarity and completeness only.

To the extent the Examiner relies on Official Notice for the limitation of "interpolating between said selected even or odd interlaced rows, to fill, repectively, the missing odd or even rows," Applicant respectfully traverses the Official Notice and respectfully requests that the Examiner provide a reference showing the elements at issue to establish proper prima facie rejection for obviousness under § 103(a).

Ng's only reference to interpolation relates to combining the output from the temporal and spatial de-interlacers. According to Ng, "[t]he combined result may be multiplied by ½ (*i.e.*, an average), for example, to produce the missing scan lines of the interlaced field for the deinterlace output picture." Col. 8, lines 61-63. However, this is not the same as interpolating between the selected even or odd interlaced rows. Furthermore, it is not the same as interpolating between the selected even or odd interlaced rows *in response* to the image reason moving faster than a threshold rate.

The selected odd or even rows of the claimed de-interlaced video signal comprise both temporal and spatial data. Thus, the interpolation takes both spatial and temporal data, or all the data found within an odd or even row, to fill the missing

respective even or odd row to create a complete de-interlaced signal. This is a very different process from Ng, one that may require less processing power and result in a purposeful loss of spatial information, something which Ng expressly teaches against.

Because the Office Action fails in establishing a prima facie case of obviousness using Ng as a sole reference, applicant respectfully submits claims 21, 37, 53, and 54 are patentably distinct, and thus allowable.

Ng Does Not Teach Choosing and Applying a Frame Rate Conversion Ratio for Conversion to a Destination Video Data Type

The Examiner rejected claim 38 as anticipated by Ng, but addressed only the first two elements as being anticipated. Claim 38, as amended, claims a method for converting an encoded video signal comprising the steps of:

> determining a source video data type encoded in said encoded video signal;
>
> determining whether said source video data type is one for which interframe motion compensation data should be for conversion;
>
> selecting a particular frame rate conversion ratio if said source video data type is capable of conversion without use of said interframe motion compensation data; and
>
> using said frame rate conversion ratio to convert each frame of said source video data type to one or more frames of destination video data type.

The Examiner addressed determining the source of video data type and whether or not it is of the type for which interframe motion compensation data should be for conversion. The Examiner asserts that Ng teaches a conversion system based on motion information, whether to utilize only a spatial interpolation algorithm or a combination of spatial interpolation and temporal interpolation.

Claim 38, however, discusses a choice of whether to use motion compensation data in conversion of a specific source data type, not whether to suppress the temporal de-interlaced data.

Ng does not also teach or suggest that, when deciding against applying a conversion technique to adapt for motion, to then determine and apply the correct frame rate conversion ratio to the interlaced video signal "to convert each frame of said source video data type to one or more frames of destination video data type." As the Examiner did not even address the patentability of these last two elements, the Examiner's contention that claim 38 is anticipated fails. Thus, claim 38 is patentable, and claims 39-49 are likewise patentable by virtue of their dependence from claim 38.

Conclusion

In view of the foregoing, claims 1-19, 21-35, 37-50, and 53-55, as amended, are believed to be patentably distinct over the cited reference. Favorable action is respectfully requested.

Respectfully submitted,

Digeo, Inc.

By _____
Kory D. Christensen
Registration No. 43,548

STOEL RIVES LLP
One Utah Center Suite 1100
201 S Main Street
Salt Lake City, UT 84111-4904
Telephone: (801) 328-3131
Facsimile: (801) 578-6999
Attorney Docket No. 50588/318